HATCHERY EVALUATION REPORT

Winthrop NFH - Spring Chinook

December 1996

Integrated Hatchery Operations Team (IHOT)

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An Independent Audit Based on Integrated Hatchery Operations Team (IHOT) Performance Measures

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Section 1

Executive Summary

This report presents the findings of the independent audit of the Winthrop NFH - Spring Chinook program. The hatchery is located along the Methow River in north-central Washington, near the town of Winthrop. The hatchery is used for adult collection, incubation, and rearing of spring chinook and summer steelhead

The audit was conducted in 1996-1997 as part of a 2-year effort that will include 67 hatcheries and satellite facilities located on the Columbia and Snake River system in Idaho, Oregon, and Washington. The hatchery operating agencies include the U.S Fish and Wildlife Service, Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, and Washington Department of Fish and Wildlife.

Background

The audit is being conducted as a requirement of the Northwest Power Planning Council (NPPC) "Strategy for Salmon" and the Columbia River Basin Fish and Wildlife Program. Under the audit, the hatcheries are evaluated against policies and related performance measures developed by the Integrated Hatchery Operations Team (IHOT). IHOT is a multi-agency group established by the NPPC to direct the development of new basinwide standards for managing and operating fish hatcheries. The Bonneville Power Administration (BPA) contracted with Montgomery Watson to act as an independent contractor for the audit.

IHOT has established five basic policies that cover: (1) hatchery coordination, (2) hatchery performance standards, (3) fish health, (4) ecological interaction, and (5) genetics. The audit focuses on all these policies, with the exception of hatchery coordination. These policies are set forth in *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1995).* That document is the source for the performance measures that are the basis of this audit.

The Audit Process

The audit was based on the facility management's response to a 109-page questionnaire. This audit form was completed through a five-step process in which:

- Information was obtained from headquarters.
- The hatchery manager was asked to fill out and return the audit form.
- A 1-2 day site audit visit was conducted to inspect facilities, review hatchery records, discuss audit form responses, and develop remedial action plans.
- A compliance report was developed to document the compliance status of each performance measure. This report was then shared with the hatchery manager and IHOT representative.
- This hatchery evaluation report was written to document compliance with IHOT performance measures and develop cost estimates for remedial actions when needed.

Winthrop NFH - Spring Chinook Results

The Winthrop NFH facility includes 2 ponds for adult holding, 62 concrete raceways, 46 starter tanks, and incubation facilities. The hatchery was constructed in 1942 to mitigate for fish losses in the upper Columbia River drainage caused by the construction of Grand Coulee Dam.

The Winthrop NFH - Spring Chinook program was in general compliance with most of the performance measures. In the area of program objectives, the hatchery was not meeting its adult return goal. The audit found that the hatchery did not have current water quality data showing compliance with IHOT standards and was not in compliance with the pathology-free water criteria and was lacking some alarm systems, which are all facilities requirements. The hatchery also was not in compliance with the adult holding criteria, did not have enough useable rearing space for the full program and needed to upgrade the pollution abatement facilities. In the compliance area for Hatchery Practices, the hatchery did not have written incubation standards for the incubation buckets, did not meet the release number or size goals. In the compliance area for fish health policy, the hatchery did not have a pathogen free water supply and did not use foot baths at the incubation facility. As with program objectives, in the area of ecological interactions the hatchery did not have a smoltification goal in place. Likewise, the hatchery did not have a Genetics Monitoring and Evaluation Program.

The specific areas in which the Winthrop NFH - Spring Chinook program requires remedial actions based on the IHOT performance measures are listed below. These remedial actions are listed in alphabetical order without intent of ranking or otherwise assigning priority:

- Develop alarm log
- Develop disease-free water supply for incubation and early rearing
- Develop pathogen free water supply and implement IHOT sanitation procedures
- Develop genetics M&E plan and have it reviewed by a geneticist
- Establish criteria for incubation buckets
- Implement checking procedures for alarms
- Implement use of foot baths according to IHOT protocols
- Improve pollution abatement pond and system to meet current engineering practice (currently under design)
- Install flow/level alarms at the intake
- Review release size goal to reflect hatchery conditions and current management policy.
- Monitor and record dissolved nitrogen
- Monitor and record DO
- Monitor the facility security and take appropriate actions if needed
- Provide smoltification data
- Replace A and B - Bank with 64 - 8 x 80 raceways (based on equivalent F-L Volume
- Replace C - Bank with 32 - 8 x 80 raceways (based on equivalent F-L Volume
- Run analysis for alkalinity and hardness
- Run analysis for IHOT-listed contaminants
- Run analysis for turbidity
- Run analysis on nitrites
- Run chemical analysis for IHOT water quality parameters

Non-compliance issues resulting from items beyond human control or Performance Measures not relevant to this hatchery (Type 1 in Table 3, Section 4 of this report) were not listed above.

Section 2

Facility Description

Name: Winthrop National Fish Hatchery (operated as a part of the Leavenworth National Fish Hatchery Complex)

Stock/Species: Spring Chinook
Summer Steelhead

Operating Agency: U.S. Fish and Wildlife Service

Funding Agency: U.S. Fish and Wildlife Service

Location: Winthrop NFH is located along the Methow River in north-central Washington, near the town of Winthrop.

Address: Winthrop National Fish Hatchery
Leavenworth National Fish Hatchery Complex
U.S. Fish and Wildlife Service
12790 Fish Hatchery Road
Leavenworth, WA 98826

Hatchery Manager: Mr. Bill Wallien

Phone: (509) 996-2424
Fax: (509) 996-3207

Purpose: The hatchery was originally authorized as part of the Grand Coulee Fish Maintenance Project. The first fish cultural operation began in 1942 by trapping adult sockeye, chinook, and steelhead at Rock Island Dam and transporting them to the hatchery. By 1951, the station was rearing sockeye, chinook, steelhead, kokanee, coho, and resident trout.

The goal of Winthrop Hatchery is to produce spring chinook to help compensate for fish losses in the upper Columbia River drainage caused by the construction of Grand Coulee Dam.

Production Goal:

Spring Chinook

Produce 1 million yearling spring chinook for on-station releases

Summer Steelhead

Produce 100,000 smolts for on-station release

Water Supply: Water rights total 29,930 gpm from the Methow River, Spring Branch Spring, and two wells (6.,000 gpm total capacity). Water use ranges

from 8,528 to 27, 686 gpm with the Methow River providing the majority of the flow.

Facilities:

Adult Holding:	Adults held in upper end of fish ladder
	2 large concrete adult holding ponds (not used)
Incubation:	400 individual bucket incubators for green to eye-eggs
	Vertical tray incubators (336 trays)
Early Rearing:	46 starter tanks
Raceways:	30 raceways - 1,300 cf each
	16 Converted Foster-Lucas ponds - 2400 cf each
	16 Foster-Lucas ponds - 2400 cf each
Rearing Ponds:	none
Satellite Facilities:	none

Section 3

Compliance Status

The hatchery audits are based on compliance with written IHOT performance measures. These performance measures are documented in ***Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries*** (referred to as *IHOT 1995* in this report).[1] The purpose of the performance measures is to implement new basinwide policies that provide regional guidelines for operating anadromous hatcheries in the Columbia Basin.

The audit focuses on performance measures for IHOT policies that cover (1) hatchery performance standards, (2) fish health, (3) ecological interaction, and (4) genetics. These performance measures are intended to guide hatchery operations once production is established. For that reason, the hatchery operations audit included broodstock collection, spawning, incubation of eggs, fish rearing and feeding, fish release, equipment maintenance and operations, and personnel training. Production priorities are beyond the scope of this audit.

Based on *IHOT 1995*, a detailed 109-page audit form was developed. The audit form divided the performance measures into six major sections along major program and technical criteria areas. Two additional sections (sections 1 and 8) include general information and expenditure information needed for this Hatchery Evaluation Report and blank forms for additional comments. The following is the basic structure of the IHOT audit form:

Section 1	Performance Measures for General Information and Expenditure Information (PMs General 1-2)
Section 2	Performance Measures for Program Objectives (PMs 1-4)
Section 3	Performance Measures for Facility Requirements (PMs 5-15)
Section 4	Performance Measures for Hatchery Practices (PMs 16-25)
Section 5	Performance Measures for Fish Health Policy (PMs 26-34)
Section 6	Performance Measures for Ecological Interactions (PMs 35-38)
Section 7	Performance Measures for Genetics Policy (PMs 39-43)
Section 8	Blank Forms for Additional Comments

Several performance measures are repeated in various sections of the audit form. These performance measures overlap in *IHOT 1995* and were retained to allow individuals interested in specific portions of the audit (such as Genetics or Fish Health) to determine the compliance status of all performance measures for a given topic in one location. A repeated performance measure is indicated by shaded text.

The Hatchery Audit Process

The hatchery audit will be conducted over a 2-year period that concludes in 1997. At each hatchery, a five-step process was used to complete the overall hatchery audit. This process consisted of research and onsite visits. The site visit at the Winthrop NFH was conducted on October 22-23, 1996.

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[1]Integrated Hatchery Operations Team (IHOT) 1995. *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries*, Bonneville Power Administration, Portland, Oregon.

The following is the five-step audit process:

1. Information was obtained from headquarters.

2. The hatchery manager was asked to fill out and return the **Audit Form**.

3. A 1-2 day site audit visit was conducted at each hatchery. During that visit an audit team inspected facilities, reviewed hatchery records, discussed audit form responses, and developed remedial action plans when appropriate.

4. During the site visit, the compliance status of each performance measure was discussed with the hatchery manager and IHOT representative. A portion of the Hatchery Evaluation Report was sent to the hatchery manager following the audit visit as a **Compliance Report**. That Compliance Report is Table 2 of this report.

5. Information from steps 1-4 was used to prepare a draft **Hatchery Evaluation Report**. This draft report was submitted to the operating agencies for review of the information used to determine compliance. Based on review and comments, a final Hatchery Evaluation Report was developed. The final report documents the compliance of a particular hatchery with the IHOT performance measures and presents cost estimates to correct any deficiencies.

Compliance Status of Winthrop NFH - Spring Chinook

The following table includes information on life-stages that are held on this facility for some portion of their rearing cycle (Table 1). For multi-facility programs, summary cost and contribution data is presented at the facility where rearing occurs. For the compliance status relating to performance measures that do not occur at this hatchery, please refer to the Hatchery Evaluation Reports for the hatcheries and stocks listed in Table 1. A check mark (✔) indicates that the specific life-stage is held at this facility.

This section documents the compliance status of the Winthrop NFH - Spring Chinook program. Each performance measure is presented in a table taken from the audit form (Table 2). The compliance status is identified by the following categories:

- **N/A** (not applicable)
- **Yes** (in compliance)
- **?** (unknown; generally due to unavailability of information to determine compliance)
- **No** (not in compliance).

Remedial actions are suggested for performance measures not in compliance. These remedial actions are grouped into categories and listed in Section 4 of this report, where the cost of the required remedial actions is also presented.

Table 1 Summary Program Information for Winthrop NFH - Spring Chinook

Component	Location of Adult Holding, Spawning, Incubation, and Rearing					
	Winthrop NFH[1]					
Adult Collection	✔					
Adult Holding	✔					
Spawning	✔					
Fertilization	✔					
Incubation	✔					
green-to-eyed	✔					
eyed-to-hatch	✔					
Rearing	✔					
fry	✔					
fingerlings	✔					
smolts	✔					
Acclimation/release	✔					

[1] In 1993/1994, eggs were obtained from Leavenworth NFH to fill shortfall; practice has stopped.

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
the hatchery programs outlined in a subbasin nagement plan?		✔			Columbia Basin System Planning Production Plan and the Columbia River Fish Management Plan (US -vs- Oregon)	
ne hatchery operating under a current hatchery rational plan?		✔			IHOT Operations Plan and Facility O&M Manual	
s it understood by staff?		✔				
s it being followed?		✔				
hatchery monitoring and evaluation plan in place?						
Do you have a written monitoring and evaluation plan?		✔			Hatchery Evaluation Team 5-yr Plan for Leavenworth, Entiat, Winthrop NFH	
ult contribution to fisheries, spawning grounds, and chery		✔			Review of records	
ult pre-spawning survival as compared with blished goal		✔			Review of records; in compliance 5 out of last 5 years	
-take as compared with established hatchery goal				✔	Review of records; in compliance 3 out of last 5 years	Increase adult returns
en-egg to eyed-egg survival as compared with blished goal		✔			Review of records; in compliance 5 out of last 5 years	
d-egg to fry survival as compared with established l		✔			Review of records; in compliance 4 out of last 4 years	
to smolt survival as compared with established goal				✔	Review of records; in compliance 2 out of last 5 years. Remedial actions to solve earlier problems with BKD and predation have been addressed. Monitor the effectiveness of actions taken to increase smolt survival	None
duction as compared with established goal				✔	Review of records; in compliance 2 out of last 4 years	Increase adult returns
cent survival (smolt to adult) as compared with blished goal				✔	Review of records; in compliance 0 out of last 5 years	Increase adult returns

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
nber of eggs, fry, fingerlings, smolts, and/or adults ıeet basinwide needs	✔				Review of records/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
nperature						
Does your water temperature meet the criteria for spawning?		✔			Review of records/Discussion	
Does your water temperature meet the criteria for ncubation?		✔			Review of records/Discussion	
Does your water temperature meet the criteria for earing?		✔			Review of records/Discussion	
solved gases						
s the oxygen level near saturation?			✔		No current data.	Monitor and record DO
s the dissolved nitrogen level less than saturation?			✔		No current data. Submitted 1982 data showed a problem but the hatchery feels the actions they have taken has solved the nitrogen problem	Monitor and record dissolved nitrogen
emistry						
mmonia (un-ionized)			✔		No data since 1982	Run analysis
Carbon Dioxide			✔		No data since 1982	Run analysis
Chlorine			✔		No data since 1982	Run analysis
H			✔		No data since 1982	Run analysis
Copper			✔		No data since 1982	Run analysis
Hydrogen Sulfide			✔		No data since 1982	Run analysis
ron			✔		No data since 1982	Run analysis
inc			✔		No data since 1982	Run analysis
bidity						
Does your turbidity meet the criteria?			✔		No data since 1982. The 1982 data showed acceptable levels	Run analysis

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
alinity and hardness						
)oes your alkalinity and hardness meet the criteria?			✔		No data since 1982. All supplies in 1982 samples are all in compliance	Run analysis
:ite						
)oes your nitrite meet the criteria?			✔		No data since 1982	Run analysis
:ontaminants						
ıldrin			✔		No data	Run analysis
ndrin			✔		No data	Run analysis
)ieldrin			✔		No data	Run analysis
Ieptachlor			✔		No data	Run analysis
:hlordane			✔		No data	Run analysis
Iethoxychlor			✔		No data	Run analysis
.indane			✔		No data	Run analysis
Ialathion			✔		No data	Run analysis
;uthion			✔		No data	Run analysis
hogens						
Vhat portions of the hatchery have disease-free water?						
Adult holding				✔	Pathogens have also been found in infiltration wells.	Hatchery is generally able to control diseases
Incubation				✔	See above	See above
Early rearing				✔	See above	See above
Rearing				✔	See above	See above
Others (Acclimation)				✔	See above	See above

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
rm Systems						
)o the following areas have alarms?						
Intake				✔	Inspection/Discussion	Install flow/level alarms at the intake
Large rearing ponds and adult holding ponds		✔			Inspection/Discussion	
Raceway headboxes and rearing ponds		✔			Inspection/Discussion	
Incubation facilities		✔			Inspection/Discussion	
Quarantine areas and facilities	✔				Inspection/Discussion	
Water treatment systems	✔				Inspection/Discussion	
Security				✔	Security has not been a problem with hatchery staff on-site	Monitor the facility security and take appropriate actions if needed
ıre there outside systems and buzzers in onsite esidences?		✔			Discussion	
ıre water flow alarms checked daily?		✔			Review of records/Discussion	
ıre all other alarms checked weekly?				✔	Discussion	Implement alarms checking procedures
; there a log of alarms for emergencies, tests, and ıaintenance requirements?				✔	Review of records/Discussion	Establish alarm log
ıre telephone pagers used?		✔			Discussion	
ılt collection and holding facilities						
)o you meet the adult holding criteria?				✔	Construction of the adult holding structure is incomplete. Adult capture and spawning is conducted in the entrance channel, which is inadequate	Rebuild adult holding facility

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
ıbation facilities						
'ype 1: Marisource Vertical Trays)o you have an adequate number of units for the verall program?		✔			Inspection of facilities/Discussion	
'ype 2: Incubation Buckets)o you have an adequate number of units for the verall program?		✔			Inspection of facilities/Discussion	
ıring facilities						
'ype 1: Starter Tanks))o you have an adequate number of units for the verall program?		✔			Discussion	
'ype 2: 8x80 Raceways (D & E Bank))o you have an adequate number of units for the verall program?				✔	To rear full Chinook and Summer Steelhead programs additional raceways are required. See below	Provide sufficient capacity for full program without Banks A, B and C
'ype 3: 12x102 Raceways (C-bank))o you have an adequate number of units for the verall program?				✔	Raceways are converted Foster Lucas ponds. These facilities are near the end of their useful life. Suited to short term use	Replace C- Bank with 32 - 8 x 80 raceways (based on equivalent F-L Volume)
'ype 4: Foster Lucas Ponds (A & B Bank))o you have an adequate number of units for the verall program?				✔	Foster Lucas Ponds are past their useful life	Replace A and B- Bank with 64 - 8 x 80 raceways (based on equivalent F-L Volume)
eening facilities						
)o you meet the approach velocity criteria?		✔			Inspection of facilities/Discussion	
ıre the fish screens regularly cleaned?		✔			Inspection of facilities/Discussion	
)oes the screen mesh meet screen opening criteria?		✔			Inspection of facilities/Discussion	
ıre rearing containers double screened for fish that hould not be released to adjacent water?	✔				Fish are released in subbasin	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
dator control facilities						
ıre your predation control facilities effective?		✔			A & B portable nets are moderately effective, C - effective; D & E - New covers and side fencing	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
d storage facilities and quality control						
)oes the storage of dry/semi-moist/moist foods dry<12%; semi-moist 12-20%; moist >20% moisture) ollow food manufacturer's recommendations?		✔			Discussion	
)oes a regional quality control officer oversee roduction procedures and monitor:						
Verification by feed manufacturer that ingredients meet specifications?		✔			Discussion; Ann Gannan, Fish Nutritionist, Abernathy SCTC	
Ensure feed does not contain unwanted drugs or other additives?		✔			Discussion	
Analyze ingredients contained in the final food product to ensure that feed specifications have been met?		✔			Discussion	
ıre the foods stored and handled according to the ollowing criteria?						
Moist pellets should not exceed 10 °F at point of delivery.		✔			Discussion	
Moist pellets should be removed from freezer just prior to feeding.		✔			Discussion	
Do not leave buckets of feed or feed containers outside exposed to light or heat.		✔			Discussion	
Open bags of feed should be fed within 1 to 2 days except when feeding small groups of fish.		✔			Discussion	
Automatic feeder hoppers and bulk storage facilities should be insulated against excessive temperatures (80°F and above).	✔				Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
ease facilities						
)o the release facilities ensure that fish are not ubjected to adverse conditions?		✔			Inspection of facilities/Discussion	
lution abatement facilities						
)o the pollution abatement facilities meet all federal nd state regulations (or good engineering practice)?				✔	Inspection of facilities/Discussion	Improve pollution abatement pond and system to meet current engineering practice (currently under design)
ıre pollution abatement facilities operated correctly?		✔			Discussion	
nsportation facilities						
ıre the transport systems adequate to meet IHOT erformance measures for transportation practices?	✔				Released on station	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
odstock selection practices						
s the donor selection process document attached? (PM 40a)	✔				Existing program; does not apply	
Was the donor selection outline followed in selecting ne hatchery broodstock? (PM #40b-c)	✔				Existing program; does not apply	
wning practices						
Were the appropriate number of spawners, male/female atios, and fertilization protocols used? (PM #42c-g)		✔			Review of records/Discussion	
ıbation practices						
specific incubation standards listed in the hatchery rations plan?				✔	Reviewed IHOT Operations Plan and Hatchery O&M. Yes for vertical trays, no for the incubation buckets	Establish criteria for incubation buckets
incubation practices written?				✔	See above	Establish criteria for incubation buckets
ıbation Type 1: Vertical Inc. Trays (Marisource) (see #8) you meet the loading and flow criteria?		✔			Review of records/Discussion	
ıbation Type 2: Incubation Buckets PM #8) you meet the loading and flow criteria?			✔		No IHOT or facility criteria for incubation buckets	Establish criteria for incubation buckets

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
ring practices						
specific rearing standards listed in the hatchery rations plan?		✔			Review of IHOT Hatchery Operations Plan and Station Manual	
rearing practices written?		✔			Review of Hatchery Operations Plan	
earing Unit Type 1: Starter Tanks see PM #9)						
Do you meet the density and DI criteria?		✔			Hatchery uses DI criteria lower than the IHOT	
Do you meet the Loading and FI criteria?		✔			Review of records/Discussion	
earing Unit Type 2: Raceways (see PM #9)						
Do you meet the density and DI criteria?		✔			Review of records/Discussion	
Do you meet the Loading and FI criteria?		✔			Review of records/Discussion	
earing Unit Type 3: Foster Lucas (A & B) (see PM 9)						
Do you meet the density and DI criteria?		✔			Review of records/Discussion	
Do you meet the Loading and FI criteria?		✔			Review of records/Discussion	
olt quality						
Do you produce a high quality smolt?		✔			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
h health management practices						
re the monthly hatchery monitoring visits being onducted? (PM #26)		✔			Review of reconds/Discussion	
re the annual broodstock inspections being conducted? PM #27)		✔			Review of reconds/Discussion	
there pathogen-free water and are the sanitation rocedures being followed? (PM #28)				✔	Discussion	Develop pathogen-free water supply and implement IHOT sanitation procedures
re the following water quality parameters within riteria? (PM #5a-5g)						
Water temperature		✔			Review of reconds/Discussion	
Dissolved gases			✔		No Data	See PM # 5b
Chemistry			✔		No Data	See PM # 5c
Turbidity			✔		No Data	See PM # 5d
Alkalinity and hardness			✔		No Data	See PM # 5e
Nitrite			✔		No Data	See PM # 5f
Contaminants			✔		No Data	See PM # 5g
re rearing standards being followed? (PM #19)		✔			Review of records/Discussion	
re egg and fish transfer/release requirements met? PM #31)		✔			Review of records/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
s hatchery performance meet requirements lined in the regional hatchery policies and in basin and hatchery plans for the following areas?						
cent smoltification						
Do you measure percent smoltification?		✔			Discussion, ATPase completed by NBS lab	
Did you have a smoltification goal?		✔			Discussion	
Did you meet the smoltification criteria?			✔		Discussion. No data	Provide smoltification data.
ring density (prior to release)						
Did you meet the rearing density criteria just prior to release?		✔			Review of records/Discussion	
ease condition (at release)						
Did you meet all disease regulations just prior to release?		✔			Review of records/Discussion	
nber (at release)						
Did you meet the release number goal?				✔	Review of records/Discussion	Improve adult returns and fry to smolt survival
at release						
Did you meet the size goal?				✔	Hatchery uses higher temp ground water to reduce disease potential	Review release size goal to reflect hatchery conditions and current management policy.
es of release						
Did you meet the release date goal?		✔			Review of records/Discussion	
ation of release						
Did you release the fish at the specified location?		✔			Review of records/Discussion	
fish reared in the subbasin or acclimated in the basin?						
Are the fish reared in the subbasin?		✔			Discussion	
Are the fish acclimated in the subbasin?		✔			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
ıe release strategy appropriate for the program?		✔			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
nsportation facilities						
)o transportation equipment and personnel receive isinfection before and after use?	✔				No transportation for this stock	
; the fish tank interior disinfected using a solution of 00 ppm active chlorine for 30 minutes minimum or ɔrmaldehyde gas generation method (relative humidity f 60% for 2 hrs)?	✔				See above	
Is the exterior of the fish transport vehicle disinfected using high pressure steam (115-130°C), high temperature acid, or with 200 ppm chlorine for 30 minutes?	✔				See above	
; the fish transport vehicle (cab) disinfected using 600 pm quaternary ammonia compounds (1.5 ml of 50% tock solution/liter water)?	✔				See above	
; other equipment disinfected including fish pumps, ets, egg sorters, waders, boots, rain gear, hoses and ther equipment using one of the following solutions?	✔				See above	
200 ppm chlorine for 30 minutes	✔				See above	
600 ppm quaternary ammonia compound for 30 minutes	✔				See above	
200 ppm iodophor solution for 10 minutes	✔				See above	
)o personnel wear protective garments when handling sh eggs or cultural water?	✔				See above	
)o the fish transport truck/chassis and tank/unit receive n inspection and service prior to the release season?	✔				See above	
; a daily service inspection completed before starting p and leaving for the day?	✔				Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
nsportation facilities						
)oes the fish transport unit receive an inspection prior) loading?	✔				See above	
)oes a pre-loading inspection covering tank water evel, pumps or aerators, oxygen injection system ettings, displacement gauge, and truck loading/hauling ensity tables checked and reviewed occur prior to)ading fish in the transport unit?	✔				See above	
)o hauling criteria include checking the fish 45 minutes) 1 hour after loading?	✔				See above	
Vhen fish are active and systems are functioning roperly, is the oxygen concentration reduced and ıaintained at approximately 8 ppm?	✔				See above	
; water temperature in the transportation unit ıaintained within the 42-48 °F range?	✔				See above	
)o fish releasing procedures include the following riteria?	✔				See above	
Releasing the fish at the correct release site or into the correct water body.	✔				See above	
Tempering or the difference between the liberation tank and the target water body should not exceed 10°F.	✔				See above	
The liberation hose should be angled so that fish gently hit the water. Using a tripod is a method of ensuring the hose will stay at the proper angle.	✔				See above	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
luation practices						
las the hatchery conducted fishery contribution studies):						
Determine the requirements for evaluating and improving management programs?		✔			Discussion	
Develop guidelines that define the geographical area and identify component stocks (hatchery and/or wild) that comprise the management unit?		✔			Discussion	
Develop guidelines that define if the proper stocks of fish are currently being used?		✔			Discussion	
Determine which management units contribute to a specific fishery and the time periods of those contributions?		✔			Discussion	
Determine the relative contributions of the various management units to a specific fishery over the different time periods?		✔			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
ining practices						
Does the hatchery have a training schedule for its staff?		✔			Review of records/Discussion	
Does each staff member have a personal training plan approved by a supervisor and reviewed annually?		✔			Review of records/Discussion	
Does the hatchery routinely exchange training details between other hatcheries and agencies?		✔			Review of records/Discussion	
Does the hatchery encourage and reward off-duty training of staff?		✔			Review of records/Discussion	
Does the hatchery conduct monthly staff meetings?		✔			Review of records/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
monthly hatchery monitoring visits being ducted by a qualified fish health specialist as cribed below?						
Conduct visit at least monthly		✔			Review of records/Discussion	
Monitoring conducted by qualified fish health specialist		✔			Review of records/Discussion	
Examine a representative sample of healthy and moribund fish from each lot.		✔			Review of records/Discussion	
Review fish culture practices with hatchery manager.		✔			Review of records/Discussion	
Report finding and results of necropsies on standard form.		✔			Review of records/Discussion	
Recommend appropriate drug or chemical treatment.		✔			Review of records/Discussion	
Summarize fish health status or stock prior to release or transfer to another facility.		✔			Review of records/Discussion	
all of the functions of the hatchery yearly nitoring visits being completed as described below?						
Annually examine each broodstock for the presence of reportable viral pathogens.		✔			Review of records/Discussion	
Annually screen each salmon broodstock for the resence of *Renibacterium salmoninarum*.		✔			Review of records/Discussion	
Conduct inspection by or under the supervision of ualified fish health specialist.		✔			Review of records/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
ıe hatchery following accepted sanitation cedures?						
ıre there any sources of pathogen-free water, especially or incubation and early rearing?				✔	Discussion	Develop disease free water supply for incubation and early rearing
ıre the hatchery sanitation procedures understood and eing followed as described below?						
Disinfect/water harden eggs in iodophor?		✔			Inspection of facilities/Discussion	
Are foot baths containing disinfectant placed at the incubation facility's entrance and exit?				✔	Inspection of facilities/Discussion	Implement use of foot baths per IHOT
Is equipment and rain gear utilized in broodstock handling or spawning sanitized prior to its use elsewhere in the hatchery?		✔			Inspection of facilities/Discussion	
Is equipment used to collect dead fish sanitized prior its use in another pond and/or lot of fish?		✔			Inspection of facilities/Discussion	
Is equipment, including vehicles used to transfer fish between facilities, disinfected prior to use with any other fish lots or at any other location?	✔				No transfers from this facility	
Are rearing vessels sanitized after fish are removed and prior to introducing a new fish lot or stock?		✔			Inspection of facilities/Discussion	
Are dead fish properly disposed of?		✔			Inspection of facilities/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
water quality parameters being followed?						
re the following water quality parameters within riteria? (PM #5a-5g)						
Water temperature		✔			Review of reconds	
Dissolved gases			✔		No Data	See PM # 5b
Chemistry			✔		No Data	See PM # 5c
Turbidity			✔		No Data	See PM # 5d
Alkalinity and hardness			✔		No Data	See PM # 5e
Nitrite			✔		No Data	See PM # 5f
Contaminants			✔		No Data	See PM # 5g
o to PM #21						
incubation and rearing standards being followed?						
Are the incubation practices following the IHOT incubation criteria? (PM #18)			✔		Review of records/Discussion	Establish criteria for incubation buckets
Are the rearing practices following the IHOT criteria? (PM #19)		✔			Review of records/Discussion	
o to rearing practices PM #18-PM #19						
egg and fish transfer/release requirements met?		✔			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
ıe hatchery's program outlined in a subbasin ıagement plan? ɔo to subbasin plan PM #1		✔			Columbia Basin System Planning Production Plan and the Columbia River Fish Management Plan (US -vs- Oregon)	
ıe hatchery operating under a current hatchery rational plan? ɔo to operational plan PM #2		✔			IHOT Operations Plan and Facility O&M Manual	
hatchery monitoring and evaluation plan in place? ɔo to hatchery monitoring and evaluation plan PM #3		✔			Hatchery Evaluation Team 5 yearr Plan for Leavenworth, Entiat, Winthrop NFH	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
s the hatchery program meet requirements blished in the regional hatchery policies and basin planning documents in the following areas: cies, stock, broodstock collection location, odstock numbers, broodstock collection strategy, spawning and egg-take protocols?						
Does the hatchery program meet the requirements for he following?						
Species protocols (PM #4a)		✔			Review of records/Discussion	
Stock protocols (PM #4a)		✔			Review of records/Discussion	
Broodstock collection location protocols (PM #41b)		✔			Review of records/Discussion	
Broodstock numbers protocols (PM #42c)		✔			Review of records/Discussion	
Broodstock collection strategy protocols (PM #41b-d)		✔			Review of records/Discussion	
Spawning protocols (PM #42d-e)		✔			Review of records/Discussion	
Egg-take protocols (PM #42f-g)		✔			Review of records/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
s the hatchery's performance meet requirements						
ined in the regional hatchery policies and in basin and hatchery plans for the following areas: cent smoltification, rearing density, disease						
dition, and the number, size date(s), and location of ase?						
ercent smoltification (PM #22a1)				✔	No goal	Establish appropriate smoltification goal
earing density (PM #22a2)		✔			Review of records/Discussion	
)isease condition (PM #22a3)		✔			Review of records/Discussion	
Number at release (PM #22a4)				✔		Improve adult returns
ize at release (PM #22a5)				✔		See PM #22a5.
)ate of release (PM #22a6)		✔			Review of records/Discussion	
ocation of release (PM #22a7)		✔			Review of records/Discussion	
fish reared in the subbasin or acclimated in the basin? PM #22b		✔			Discussion	
ne release strategy appropriate for the program? PM #22c		✔			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
new programs, has a broodstock collection plan n developed?						
s the broodstock collection plan written?	✔				Existing Program; does not apply	
or a non-captive broodstock program:	✔				Existing Program; does not apply	
Was an unbiased, representative sample collected?						
Was the recommended number of broodstock collected?	✔				Existing Program; does not apply	
or a captive broodstock program:						
Were captive brood progeny excluded as donors for propagating the next generation of the captive broodstock program?	✔				Existing Program; does not apply	
Were full-sib crosses avoided?	✔				Existing Program; does not apply	
s the broodstock collection plan understood and being ollowed by staff?	✔				Existing Program; does not apply	
a new program, was the donor selection outline owed in selecting the hatchery broodstock?						
s a donor selection plan written?	✔				Existing Program; does not apply	
Was the donor selection outline followed in selecting ne broodstock?	✔				Existing Program; does not apply	
Was the target stock recommended in the donor election process actually used?	✔				Existing Program; does not apply	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
existing programs, were the broodstock collection cedures followed?						
s the broodstock collection plan written?		✔			Review of broodstock collection plan	
Does the broodstock collection plan follow the uideline:						
Was an unbiased, representative sample collected?		✔			Discussion	
Was the recommended number of broodstock collected?		✔			Discussion	
Were the broodstock collection procedures in hatchery operation plan understood and followed?		✔			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
s the appropriate number of spawners, male/female os, and fertilization protocols used?						
ıre the spawning protocols written?		✔			Review of spawning protocols	
ıre daily or weekly spawning logs available?		✔			Review of records	
Vas the appropriate number of spawners used?		✔			Discussion	
)id you attempt to spawn all collected broodstock and ındomize mating with respect to age class, and other ·aits?		✔			Discussion	
Vas the sex-ratio within the limits given in the erformance standards?		✔			Discussion	
Vere the fertilization protocols followed?		✔			Discussion	
: the hatchery needed to reduce the number of eggs etained, was this done by representative sampling of ach male/female cross?		✔			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
ıere a genetics monitoring and evaluation program lace?						
; a genetics monitoring and evaluation program vailable?				✔	No plan provided	Develop genetics M&E plan and have it reviewed by a geneticist.
)oes the plan address the following elements listed in HOT:						
Does the program have elements needed to meet evaluation goals 1-4?				✔	Discussion	See above
Has a qualified geneticist reviewed and endorsed the program (goal 5)?				✔	Discussion	See above
Will the program collect the data and maintain the records needed to evaluate compliance on an ongoing basis (goal 5)?				✔	Discussion	See above
Is the program understood and followed by staff?				✔	Discussion	See above

Section 4

Remedial Actions

Based on the compliance status for each performance measure, remedial actions were developed. The required remedial actions are organized into five categories. The types of categories range across a spectrum from those actions that are beyond human control, to those that require a change in agency policy or procedures, to those that involve a significant capital cost to put in place. The following are the five types of remedial actions identified under phase 1 of the audit:

The Five Types of Remedial Actions

Type	Description
1	Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery
2	Remedial actions requiring changes in agency policies or procedures
3	Remedial actions requiring changes in monitoring coverage or interval
4	Remedial actions requiring significant capital expenditures
5	Remedial actions that may require significant capital expenditures but are not clearly definable at this time

Remedial Actions at Winthrop NFH - Spring Chinook

This section presents the corrective actions required to bring the Winthrop NFH - Spring Chinook program into compliance with IHOT performance measures. The remedial actions suggested here are just that, suggestions developed by the Montgomery Watson Audit Team. For some non-compliance areas, other remedial actions could be proposed. The required remedial actions are cross-referenced to each IHOT performance measure that was not in compliance. Where appropriate, the costs associated with the remedial actions are also presented (Table 3).

The cost estimates presented in this section are based on professional experience from similar projects. In most cases, only a lump-sum figure is presented, and detailed take-off lists have not been prepared. The cost estimates are essentially order of magnitude estimates (± 40%).

More importantly, the suggested remedial activities may also present several levels of action. Optional actions have been listed for several problems. These optional actions are desirable for either operational or safety considerations.

Table 3. Remedial Actions Required at Winthrop NFH - Spring Chinook

Remedial Action Required	Cost	PMs[1]
Type 1 - Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery		
Type 2 - Remedial actions requiring changes in agency policies or procedures		
Implement alarm checking procedures	----	6
Develop alarm log	----	6
Establish criteria for incubation buckets	----	18
Review release size goal to reflect hatchery conditions and current management policy.	----	22a5, 36
Implement use of foot baths according to IHOT protocols	----	28
Develop genetics M&E plan and have it reviewed by a geneticist	----	43
Type 3 - Remedial actions requiring changes in monitoring coverage or interval		
Monitor and record DO	----	5b,21,29
Monitor and record dissolved nitrogen	----	5b,21,29
Run chemical analysis for IHOT water quality parameters	----	5c,21,29
Run analysis for turbidity	----	5d,21,29
Run analysis for alkalinity and hardness	----	5e,21,29
Run analysis on nitrites.	----	5f, 21,29
Run analysis for IHOT-listed contaminants	----	5g, 21,29
Provide smoltification data	----	22a1

[1] PMs are performance measures that were extracted from the IHOT 1995 report. The IHOT performance measures are listed in Table 2 (Section 3 of this report) in numerical order.

Remedial Action Required	Cost	PMs[1]
Type 4 - Remedial actions requiring significant capital expenditures		
Install flow/level alarms at the intake.	$5,000	6
Replace C- Bank with 32 - 8 x 80 raceways (based on equivalent F-L Volume)	$635,000 to $750,000	9
Replace A and B- Bank with 64 - 8x80 raceways (based on equivalent F-L Volume)	$1.3 - $1.5 million	9
Improve pollution abatement pond and system to meet current engineering practice (currently under design)	$500,000	14
Develop disease-free water supply for incubation and early rearing	$800,000	21, 28
Improve pollution abatement pond and system to meet current engineering practice (currently under design)	$500,000	14
Type 5 - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
Monitor the facility security and take appropriate actions if needed	----	6
Rebuild the adult collection facility	$100,000 to $1.5 million	7
Increase adult returns and fry to smolt survival	----	4c, 4g, 4h, 22a4, 36

[1] PMs are performance measures that were extracted from the IHOT 1995 report. The IHOT performance measures are listed in Table 2 (Section 3 of this report) in numerical order.

Section 5

Hatchery Contribution to Fisheries, Spawning Grounds, and Hatcheries

This section presents the audit findings for the Winthrop NFH - Spring Chinook program contribution of adult fish to fisheries, local fisheries, spawning grounds, and hatcheries. Data is reported by broodyear. A broodyear refers to the adult contribution from the eggs produced from a single group of spawning adults. For some species, this may include fish caught as 2-, 3-, 4-, 5-, and 6-year old fish. Because of the return distribution and data processing delays, the complete adult contribution for a given broodyear may not be available until 4 to 5 years after the fish have been released from the hatchery.

Table 4. Adult Contribution to Fisheries, Spawning Grounds, and Hatcheries: Winthrop NFH - Spring Chinook

Year	Fisheries[1] (Broodyear)	Spawning Grounds[1] (Broodyear)	Hatchery[1] (Broodyear)	Total Combined Contribution[2] (Broodyear)	Smolt to Adult Survival (percent)
1981					
1982					
1983					
1984					
1985					
1986					
1987					
1988					
1989				225	0.0213%
1990				not available	
1991				not available	
1992					

[1] Data obtained from Missing Production Groups Annual Report or from the Regional Mark Information System database.

[2] Total combined adult contribution; presented when it is not possible to subdivide the contribution into fisheries, spawning grounds, and hatchery contributions.

Section 6

Annual Operating Expenditures

The level and detail of annual operating expenditures varies widely depending on hatchery, operating agency, and funding source. When provided, expenditures were presented in terms of personnel costs, operating costs (power, feed, supplies), capital costs, indirect costs charged to the federal government, third-party costs, and other costs. These cost components were summed to determine a total hatchery annual cost. Based on discussion with the hatchery manager, the percent of total hatchery costs allocated to a given program was estimated. The total hatchery costs and the percent of hatchery costs allocated to a given program were used to compute the cost of a given program. Table 5 shows the annual operating expenses for the Winthrop NFH - Spring Chinook program. For programs that occur at more than one facility (as shown on Table 1 in Section 3 of this report), the cost breakdown for the component(s) at each facility is presented in separate tables (Tables 5a, 5b, 5c, etc).

Table 5. Annual Operating Expenses: Winthrop NFH - Spring Chinook

Hatchery	1993	1994	1995
1. Winthrop	**$369,273**	**$367,690**	**$950,773**
2.			
3.			
4.			
5.			
Total Program Costs	**$369,273**	**$367,690**	**$950,773**

The total expenditures for the Winthrop NFH are presented in Table 6 by program. The detailed breakdown of program expenditures at this hatchery are presented in separate tables (Table 6a, 6b, 6c, etc).

Table 6. Annual Operating Expenses - Winthrop NFH

Program	1993	1994	1995
1. Spring Chinook	**$369,273**	**$367,690**	**$950,773**
2. Summer Steelhead	**$0**	**$0**	**$143,327**
3.			
4.			
5.			
Total Hatchery Costs	**$369,273**	**$367,690**	**$1,094,100**

Table 5a. Annual Operating Expenses: Winthrop NFH - Spring Chinook

Expenditure Occurring at Winthrop NFH

Component	1993	1994	1995
Personnel Costs	$219,647	$202,742	$201,650
Operational Costs	$149,626	$164,948	$102,450
Capital Costs			$790,791
Indirect Costs			
Lumped Hatchery Costs[1]			
Lumped Third-Party Costs			
Total Hatchery Costs	**$369,273**	**$367,690**	**$1,094,100**
Source of Funds			
Fish & Wildlife Service	**100%**	**100%**	**100%**
Program Production (lb)	43,137	35,128	24,632
Total Production (lb)	43,137	35,128	28,347
Program as Percent of Total	100%	100%	86.9%
Program Costs	**$369,273**	**$367,690**	**$950,773**

[1] When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.

Table 6a. Detailed Expenditures at Winthrop NFH by Program

Spring Chinook

Component	1993	1994	1995
Personnel Costs	$219,647	$202,742	$201,650
Operational Costs	$149,626	$164,948	$102,450
Capital Costs			$790,791
Indirect Costs			
Lumped Hatchery Costs[1]			
Lumped Third-Party Costs			
Total Hatchery Costs	**$369,273**	**$367,690**	**$1,094,100**
Source of Funds			
	100%	**100%**	**100%**
Program Production (lb)	43,137	35,128	24,632
Total Production (lb)	43,137	35,128	28,347
Program as Percent of Total	100%	100%	86.9%
Program Costs	**$369,273**	**$367,690**	**$950,773**

[1] When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.

Table 6b. Detailed Expenditures at Winthrop NFH by Program

Summer Steelhead

Component	1993	1994	1995
Personnel Costs	$219,647	$202,742	$201,650
Operational Costs	$149,626	$164,948	$102,450
Capital Costs			$790,791
Indirect Costs			
Lumped Hatchery Costs[1]			
Lumped Third-Party Costs			
Total Hatchery Costs	**$369,273**	**$367,690**	**$1,094,100**
Source of Funds			
	100%	**100%**	**100%**
Program Production (lb)	0	0	3,715
Total Production (lb)	43,137	35,128	28,347
Program as Percent of Total	0%	0%	13.1%
Program Costs	**$0**	**$**	**$143,327**

[1] When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.